IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/749,300
Filed: December 31, 2003
Inventor(s):
  Banerjee, et al.
 	
Title: EFFICIENT
  DISTRIBUTED
  TRANSACTION
  PROTOCOL FOR A
  DISTRIBUTED FILE
  SHARING SYSTEM
	Examiner: Truong, Lechi
	Group/Art Unit: 2194
	Atty. Dkt. No: 5760-18600

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir/Madam:

Further to the Notice of Appeal filed March 11, 2008, Appellants present this Appeal Brief. Appellants respectfully request that this appeal be considered by the Board of Patent Appeals and Interferences.

I. REAL PARTY IN INTEREST

The present application is owned by Symantec Corporation, a corporation organized and existing under and by virtue of the laws of the State of Delaware, and having its principal place of business at 20330 Stevens Creek Boulevard, Cupertino, California 95014.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee which will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-20 are pending. Claims 21 and 22 are canceled. Claims 1-20 are rejected, and the rejection of these claims is being appealed. A copy of claims 1-20 is included in the Claims Appendix attached hereto.

IV. STATUS OF AMENDMENTS

An amendment to the claims filed on March 11, 2008 and subsequent to the final rejection has been entered. The Appendix hereto reflects the current state of the rejected claims.

V.   SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to a first node comprising one or more processors (*see, e.g.*, Fig. 2, reference character 120; page 6, lines 10-26) and memory (*see, e.g.*, Fig. 2, reference character 122; page 6, line 27 to page 7, line 2). The memory stores program instructions executable by the one or more processors to implement receiving a request from a client application, wherein the request requires a transaction (*see, e.g.*, Fig. 3, reference character 10; page 10, lines 2-10).   The program instructions are also executable to implement, in response to the request, sending a first message to a plurality of participant nodes participating in the transaction (*see, e.g.*, Fig. 3, reference character 12; page 10, lines 11-26). The program instructions are further executable to implement, in response to receiving a reply to the first message from at least a quorum of the participant nodes, sending a second message to the plurality of participant nodes (*see, e.g.*, Fig. 3, reference character 16; page 11, lines 3-14).   Additionally, the program instructions are executable to implement, in response to receiving a reply to the second message from at least a quorum of the participant nodes, returning an indication to the client application that the request was successfully processed (*see, e.g.*, Fig. 3, reference character 20; page 11, lines 18-25) and sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction (*see, e.g.*, Fig. 3, reference character 22; page 11, lines 26-30).

Independent claim 12 is directed to a first node comprising one or more processors (*see, e.g.*, Fig. 2, reference character 120; page 6, lines 10-26) and memory (*see, e.g.*, Fig. 2, reference character 122; page 6, line 27 to page 7, line 2). The memory stores program instructions executable by the one or more processors to implement receiving a request from a client application, wherein the request requires a transaction (*see, e.g.*, Fig. 3, reference character 10; page 10, lines 2-10). The program instructions are also executable to implement, in response to the request, sending a first message to a plurality of participant nodes participating in the transaction (*see, e.g.*, Fig. 3, reference character 12; page 10, lines 11-26). The program instructions are further executable to implement, in response to receiving a reply to the first message from at least a quorum of

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the participant nodes, sending a second message to the plurality of participant nodes (*see, e.g.*, Fig. 3, reference character 16; page 11, lines 3-14). Additionally, the program instructions are executable to implement, in response to receiving a reply to the second message from at least a quorum of the participant nodes, sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction (*see, e.g.*, Fig. 3, reference character 22; page 11, lines 26-30). Completion of the transaction does not require a reply to the third message from any of the participating nodes (*see, e.g.*, page 11, line 26 to page 12, line 17).

Independent claim 14 is directed to a computer-readable memory medium storing program instructions (*see, e.g.*, Fig. 2, reference character 122; page 6, line 18 to page 7, line 2). The program instructions are executable to implement receiving a request from a client application, wherein the request requires a transaction (*see, e.g.*, Fig. 3, reference character 10; page 10, lines 2-10). The program instructions are also executable to implement, in response to the request, sending a first message to a plurality of participant nodes participating in the transaction (*see, e.g.*, Fig. 3, reference character 12; page 10, lines 11-26). The program instructions are further executable to implement, in response to receiving a reply to the first message from at least a quorum of the participant nodes, sending a second message to the plurality of participant nodes (*see, e.g.*, Fig. 3, reference character 16; page 11, lines 3-14). Additionally, the program instructions are executable to implement, in response to receiving a reply to the second message from at least a quorum of the participant nodes, returning an indication to the client application that the request was successfully processed (*see, e.g.*, Fig. 3, reference character 20; page 11, lines 18-25) and sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction (*see, e.g.*, Fig. 3, reference character 22; page 11, lines 26-30).

Independent claim 18 is directed to a computer-readable memory medium storing program instructions (*see, e.g.*, Fig. 2, reference character 122; page 6, line 18 to page 7, line 2). The program instructions are executable to implement a method comprising a first node receiving a request from a client application, wherein the request requires a

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transaction (*see, e.g.*, Fig. 3, reference character 10; page 10, lines 2-10). The method also comprises, in response to the request, the first node sending a first message to a plurality of participant nodes participating in the transaction (*see, e.g.*, Fig. 3, reference character 12; page 10, lines 11-26). The method further comprises each of the plurality of participating nodes replying to the first message by indicating an ability to commit the transaction (*see, e.g.*, Fig. 3, reference character 14; page 10, lines 19-29). The method also comprises the first node sending a second message to the plurality of participant nodes (*see, e.g.*, Fig. 3, reference character 16; page 11, lines 3-14). Additionally, the method comprises each of the plurality of participating nodes replying to the second message by indicating entrance to a state indicating that the transaction is to be committed (*see, e.g.*, Fig. 3, reference character 18; page 11, lines 15-17). The method further comprises, in response to receiving replies to the second message from at least a quorum of the participant nodes, the first node returning an indication to the client application that the request was successfully processed (*see, e.g.*, Fig. 3, reference character 20; page 11, lines 18-25). The method also comprises the first node sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction (*see, e.g.*, Fig. 3, reference character 22; page 11, lines 26-30).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1.   Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Frolund et al. (U.S. Patent No. 6,434,555, hereinafter "Frolund") in view of Johnson et al. (U.S. Patent No. 6,338,146, hereinafter "Johnson") and further in view of Frolund et al. (U.S. Patent No. 6,381,617, hereinafter "Svend," according to the Examiner's nomenclature).

VII. ARGUMENT

First Ground of Rejection:

Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Frolund et al., U.S. Patent No. 6,434,555 (hereinafter "Frolund") in view of Johnson et al., U.S. Patent No. 6,338,146 (hereinafter "Johnson") and further in view of Frolund et al., U.S. Patent No. 6,381,617 (hereinafter "Svend", according to the Examiner's nomenclature). Appellants traverse this rejection for the following reasons. Different groups of claims are addressed under their respective subheadings.

Claims 1-5, 7-11 and 14-17:

To establish a *prima facie* case of obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Appellants respectfully submit that the cited references, taken individually or in combination, do not teach or suggest all the limitations recited in claim 1. In particular, Appellants respectfully submit that the cited references, taken individually or in combination, do not teach or suggest "in response to receiving a reply to the first message from at least a quorum of the participant nodes, sending a second message to the plurality of participant nodes" and "in response to receiving a reply to the second message from at least a quorum of the participant nodes: … sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction" in combination with the remaining features of claim 1.

Frolund relates generally to a three-tiered transaction processing system including a client tier, server tier, and database tier. Frolund teaches a <u>two-phase commit protocol</u> (see, e.g., col. 6, lines 5-8). With respect to the limitation "sending a second message to the plurality of participant nodes," the Examiner has equated the second message with Frolund's <u>commit message</u> 426. As well known to those familiar with two-phase commit

protocols such as the protocol taught by Frolund, the <u>commit message</u> instructs the participants to commit the transaction.

The Examiner admits that Frolund does not teach "sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction." The Examiner relies on Svend's disclosure in combination with Frolund to teach this limitation of claim 1. However, as described above, it is Frolund's <u>commit message</u> (which the Examiner has interpreted as the <u>second message</u> recited in claim 1) that instructs the participants to commit the transaction. Therefore, there is no reason for Frolund to send a <u>third message</u> that instructs the participants to commit the transaction, as recited in claim 1.

Furthermore, Appellants respectfully submit that it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine the references in the manner suggested by the Examiner. In the Final Office Action, the Examiner asserts:

> It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching of Frolund and Johnson with Svend to incorporate the feature of returning an indication to the client application that the request was successfully processed, the third message instructs the participant nodes to commit the transaction because this allows client to be able to determine whether the database update will be performed or not.

This line of reasoning pertains to the limitation "returning an indication to the client application that the request was successfully processed." The Examiner does not provide any reasoning or any evidence of any teaching in the cited references that would motivate one skilled in the art to modify Frolund to produce the limitations "sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction" in combination with the other limitations recited in claim 1. As discussed above, there is no reason for Frolund to send a <u>third</u>

message that instructs the participants to commit the transaction because the participants are already instructed to commit the transaction by the second message.

Accordingly, claim 1 and its dependent claims 2-5 and 7-11 are believed to patentably distinguish over the cited references for at least the reasons given above. Independent claim 14 and its respective dependent claims 15-17 are believed to patentably distinguish over the cited references for at least the same reasons.

Claim 6:

To establish a *prima facie* case of obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Appellants respectfully submit that the cited references, taken individually or in combination, do not teach or suggest "wherein the second message corresponds to a message for a second phase of a three-phase commit protocol," as recited in claim 6, in combination with the features of the base claim 1.

In rejecting claim 6, the Examiner relies on the teachings of Johnson, particularly col. 2, beginning at line 12. In the cited passage, Johnson discloses a transaction service including a three-phase algorithm. However, Frolund teaches a two-phase commit protocol (see, e.g., col. 6, lines 5-8). The Examiner does not provide any reasoning or any evidence of any teaching in the cited references that would motivate one skilled in the art to modify Frolund's two-phase commit protocol to produce the limitation "wherein the second message corresponds to a message for a second phase of a three-phase commit protocol" in combination with the other limitations recited in claims 1 and 6. Accordingly, claim 6 believed to patentably distinguish over the cited references for at least the reasons given above.

<u>Claims 12 and 13</u>:

To establish a *prima facie* case of obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Appellants respectfully submit that the cited references, taken individually or in combination, do not teach or suggest all the limitations recited in claim 12. In particular, Appellants respectfully submit that the cited references, taken individually or in combination, do not teach or suggest "in response to receiving a reply to the first message from at least a quorum of the participant nodes, sending a second message to the plurality of participant nodes" and "in response to receiving a reply to the second message from at least a quorum of the participant nodes, sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction" in combination with the remaining features of claim 12.

Frolund relates generally to a three-tiered transaction processing system including a client tier, server tier, and database tier. Frolund teaches a <u>two-phase commit protocol</u>. (see, e.g., col. 6, lines 5-8). With respect to the limitation "sending a second message to the plurality of participant nodes," the Examiner has equated the second message with Frolund's <u>commit message</u> 426. As well known to those familiar with two-phase commit protocols such as the protocol taught by Frolund, the <u>commit message</u> instructs the participants to commit the transaction.

The Examiner admits that Frolund does not teach "sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction." The Examiner relies on Svend's disclosure in combination with Frolund to teach this limitation of claim 12. However, as described above, it is Frolund's <u>commit message</u> (which the Examiner has interpreted as the <u>second message</u> recited in claim 1) that instructs the participants to commit the transaction. Therefore, there is no reason for Frolund to send a <u>third message</u> that instructs the participants to commit the transaction, as recited in claim 12.

Furthermore, the Examiner does not provide any reasoning or any evidence of any teaching in the cited references that would motivate one skilled in the art to modify Frolund to produce the limitations "sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction" in combination with the other limitations recited in claim 12. As discussed above, there is no reason for Frolund to send a <u>third message</u> that instructs the participants to commit the transaction because the participants are already instructed to commit the transaction by the <u>second message</u>.

Accordingly, claim 12 and its dependent claim 13 are believed to patentably distinguish over the cited references for at least the reasons given above.

<u>Claims 18-20</u>:

To establish a *prima facie* case of obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Appellants respectfully submit that the cited references, taken individually or in combination, do not teach or suggest all the limitations recited in claim 18. In particular, Appellants respectfully submit that the cited references, taken individually or in combination, do not teach or suggest "the first node sending a second message to the plurality of participant nodes" and "the first node sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction" in combination with the remaining features of claim 18.

Frolund relates generally to a three-tiered transaction processing system including a client tier, server tier, and database tier. Frolund teaches a <u>two-phase commit protocol</u>. (see, e.g., col. 6, lines 5-8). With respect to the limitation "the first node sending a second message to the plurality of participant nodes," the Examiner has equated the second message with Frolund's <u>commit message</u> 426. As well known to those familiar

with two-phase commit protocols such as the protocol taught by Frolund, the commit message instructs the participants to commit the transaction.

The Examiner admits that Frolund does not teach "the first node sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction." The Examiner relies on Svend's disclosure in combination with Frolund to teach this limitation of claim 18. However, as described above, it is Frolund's commit message (which the Examiner has interpreted as the second message recited in claim 1) that instructs the participants to commit the transaction. Therefore, there is no reason for Frolund to send a third message that instructs the participants to commit the transaction, as recited in claim 18.

Furthermore, the Examiner does not provide any reasoning or any evidence of any teaching in the cited references that would motivate one skilled in the art to modify Frolund to produce the limitations "the first node sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction" in combination with the other limitations recited in claim 18. As discussed above, there is no reason for Frolund to send a third message that instructs the participants to commit the transaction because the participants are already instructed to commit the transaction by the second message.

Accordingly, claim 18 and its dependent claims 19 and 20 are believed to patentably distinguish over the cited references for at least the reasons given above.

For the foregoing reasons, it is submitted that the Examiner's rejection of claims 1-20 was erroneous, and reversal of the decision is respectfully requested.

The Commissioner is authorized to charge the appeal brief fee of $510.00 and any other fees that may be due to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 50-1505/5760-18600/BNK.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

The claims on appeal are as follows.

1.   A first node comprising:
one or more processors; and
memory;
wherein the memory stores program instructions executable by the one or more processors to implement:
receiving a request from a client application, wherein the request requires a transaction;
in response to the request, sending a first message to a plurality of participant nodes participating in the transaction;
in response to receiving a reply to the first message from at least a quorum of the participant nodes, sending a second message to the plurality of participant nodes;
in response to receiving a reply to the second message from at least a quorum of the participant nodes:
returning an indication to the client application that the request was successfully processed; and
sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction.

2.   The first node of claim 1,
wherein sending the third message to the plurality of participant nodes comprises sending the third message after returning the indication to the client application.

3.   The first node of claim 1,
wherein the first message comprises a message requesting each of the participant nodes to reply by indicating whether they can commit the transaction;

wherein said receiving the reply to the first message from at least a quorum of the participant nodes comprises receiving a reply indicating an ability to commit the transaction from at least a quorum of the participant nodes.

4.   The first node of claim 1,

wherein the second message comprises a message requesting each of the participant nodes to enter a state indicating that the transaction is to be committed;

wherein said receiving the reply to the second message from at least a quorum of the participant nodes comprises receiving a reply indicating entrance into the state indicating that the transaction is to be committed from at least a quorum of the participant nodes.

5.   The first node of claim 1,

wherein the first message corresponds to a message for a first phase of a three-phase commit protocol.

6.   The first node of claim 1,

wherein the second message corresponds to a message for a second phase of a three-phase commit protocol.

7.   The first node of claim 1,

wherein sending the third message to the plurality of participant nodes completes the first node's involvement in the transaction.

8.   The first node of claim 1,

wherein completion of the transaction does not require a reply to the third message from any of the participant nodes.

9.   The first node of claim 1,

wherein each participant node commits the transaction in response to receiving the third message but does not return a reply to the third message.

10.   The first node of claim 1,

wherein the request comprises a request to update a file;

wherein the transaction comprises a transaction to coordinate updates to multiple replicas of the file, wherein each respective replica is located on a respective one of the plurality of participant nodes.

11.   The first node of claim 1,

wherein the first node is a node in a peer-to-peer network;

wherein the peer-to-peer network implements a distributed file sharing system.

12.   A first node comprising:

one or more processors; and

memory;

wherein the memory stores program instructions executable by the one or more processors to implement:

receiving a request from a client application, wherein the request requires a transaction;

in response to the request, sending a first message to a plurality of participant nodes participating in the transaction;

in response to receiving a reply to the first message from at least a quorum of the participant nodes, sending a second message to the plurality of participant nodes;

in response to receiving a reply to the second message from at least a quorum of the participant nodes, sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction;

wherein completion of the transaction does not require a reply to the third message from any of the participating nodes.

13.   The first node of claim 12,

wherein sending the third message to the plurality of participant nodes completes the first node's involvement in the transaction.

14.   A computer-readable memory medium storing program instructions executable to implement:

receiving a request from a client application, wherein the request requires a transaction;

in response to the request, sending a first message to a plurality of participant nodes participating in the transaction;

in response to receiving a reply to the first message from at least a quorum of the participant nodes, sending a second message to the plurality of participant nodes;

in response to receiving a reply to the second message from at least a quorum of the participant nodes:

returning an indication to the client application that the request was successfully processed; and

sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction.

15.   The computer-readable memory medium of claim 14,

wherein sending the third message to the plurality of participant nodes comprises sending the third message after returning the indication to the client application.

16.   The computer-readable memory medium of claim 14,

wherein completion of the transaction does not require a reply to the third message from any of the participant nodes.

17.   The computer-readable memory medium of claim 14,

wherein the request comprises a request to update a file;

wherein the transaction comprises a transaction to coordinate updates to multiple replicas of the file, wherein each respective replica is located on a respective one of the plurality of participant nodes.

18.   A computer-readable memory medium storing program instructions executable to implement a method comprising:

a first node receiving a request from a client application, wherein the request requires a transaction;

in response to the request, the first node sending a first message to a plurality of participant nodes participating in the transaction;

each of the plurality of participating nodes replying to the first message by indicating an ability to commit the transaction;

the first node sending a second message to the plurality of participant nodes;

each of the plurality of participating nodes replying to the second message by indicating entrance to a state indicating that the transaction is to be committed;

in response to receiving replies to the second message from at least a quorum of the participant nodes, the first node returning an indication to the client application that the request was successfully processed; and

the first node sending a third message to the plurality of participant nodes, wherein the third message instructs the participant nodes to commit the transaction.

19.   The computer-readable memory medium of claim 18,

wherein sending the third message to the plurality of participant nodes comprises sending the third message after returning the indication to the client application.

20.   The computer-readable memory medium of claim 18, wherein the method implemented by the program instructions further comprises:

each participant node committing the transaction in response to receiving the third message;

wherein the participant nodes do not send a reply to the third message to the first node.

IX.   EVIDENCE APPENDIX

No evidence submitted under 37 CFR §§ 1.130, 1.131, or 1.132 or otherwise entered by the Examiner is relied upon in this appeal.

X.   RELATED PROCEEDINGS APPENDIX

There are no related proceedings known to Appellants, Appellants' legal representatives, or assignee which will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.